

CLAIMS

1. (currently amended) An ultra-wideband receiver comprising:

a template generator structured to generate a local signal similar to ~~an incoming signal~~ a plurality of incoming ultra-wideband signals;

a single correlator structured to correlate the ~~incoming signal~~ plurality of incoming ultra-wideband signals with the local signal;

at least one filter in communication with the correlator;

an energy estimator in communication with the at least one filter; and

a pulse detector in communication with the at least one filter.

2. (original) The ultra-wideband receiver of claim 1, wherein the template generator comprises:

a timing signal generator that generates a periodic signal;

a gate that gates the periodic signal to produce the local signal; and

an amplifier in communication with the gate.

3. (original) The ultra-wideband receiver of claim 2, wherein the gate is an AND gate.

4. (original) The ultra-wideband receiver of claim 1, wherein the local signal is a pulse of electromagnetic energy.

5. (original) The ultra-wideband receiver of claim 4, wherein the pulse of electromagnetic energy has a duration ranging from about 10 picoseconds to about 1 millisecond.

6. (original) The ultra-wideband receiver of claim 1, wherein the incoming signal comprises a plurality of pulses of electromagnetic energy.
7. (original) The ultra-wideband receiver of claim 6, wherein the plurality of pulses of electromagnetic energy comprise a plurality of ultra-wideband pulses.
8. (original) The ultra-wideband receiver of claim 7, wherein each of the plurality of ultra-wideband pulses has a duration ranging from about 10 picoseconds to about 1 millisecond.
9. (original) The ultra-wideband receiver of claim 1, wherein the incoming signal is modulated by at least one technique selected from a group consisting of: ternary modulation, binary phase shift keying, pulse amplitude modulation, and pulse position modulation.
10. (original) The ultra-wideband receiver of claim 1, wherein the single correlator comprises:
- a first filter;
 - a mixer;
 - a second filter; and
 - an amplifier.
11. (original) The ultra-wideband receiver of claim 10, wherein the first filter has a transfer function similar to a transmitter output filter.

12. (original) The ultra-wideband receiver of claim 10, wherein the first filter is a band-pass filter.

13. (original) The ultra-wideband receiver of claim 10, wherein the mixer is a multiplier configured to multiply the local signal with the incoming signal.

14. (original) The ultra-wideband receiver of claim 10, wherein the second filter is a low-pass filter.

15. (original) The ultra-wideband receiver of claim 10, wherein the amplifier is an automatic gain control amplifier.

16. (original) The ultra-wideband receiver of claim 1, wherein the energy estimator comprises:

an absolute value detector; and

an integrator.

17. (original) The ultra-wideband receiver of claim 16, wherein the absolute value detector is a square law detector.

18. (original) The ultra-wideband receiver of claim 16, wherein the integrator is configured to integrate the signal over a predetermined time period.

19. (original) The ultra-wideband receiver of claim 18, wherein the predetermined time period ranges from about 100 nanoseconds to about 1 millisecond.

20. (original) The ultra-wideband receiver of claim 18, wherein the predetermined time period is 1 microsecond.

21. (original) The ultra-wideband receiver of claim 1, wherein the pulse detector comprises:

a sample-and-hold function; and

an analog-to-digital converter.

22. (original) The ultra-wideband receiver of claim 21, wherein the analog-to-digital converter is a multi-level analog-to-digital converter.

23. (original) The ultra-wideband receiver of claim 22, wherein the multi-level analog-to-digital converter is selected from a group consisting of: a 2 level analog-to-digital converter, a 4 level analog-to-digital converter, a 6 level analog-to-digital converter, and a 8 level analog-to-digital converter.

24. (original) A method of receiving and demodulating an ultra-wideband signal, the method comprising the steps of:

receiving the ultra-wideband signal, the ultra-wideband signal comprising a plurality of ultra-wideband pulses;

generating a template signal;

correlating the ultra-wideband signal with the template signal;

estimating a coarse timing reference from a correlation of the ultra-wideband signal and the template signal;

updating the template signal based on the coarse timing reference;

correlating the ultra-wideband signal with the updated template signal; and

detecting an ultra-wideband pulse from the correlation of the ultra-wideband signal and the updated template signal.

25. (original) The method of claim 24, wherein each of the plurality of ultra-wideband pulses has duration ranging from about 10 picoseconds to about 1 millisecond.

26. (original) The method of claim 24, wherein the plurality of ultra-wideband pulses is modulated by at least one method selected from a group consisting of: ternary modulation, binary phase shift keying, pulse amplitude modulation, and pulse position modulation.

27. (original) The method of claim 24, wherein the step of correlating the ultra-wideband signal with the template signal comprises:

multiplying the ultra-wideband signal and the template signal to produce a product signal; and

attenuating a high frequency component of the product signal.

28. (currently amended) An ultra-wideband receiver comprising:

a template generator that generates a local signal similar to ~~an incoming signal~~ a plurality of incoming ultra-wideband signals;

a single correlator structured to update the local signal based on the ~~incoming~~
~~signal~~ plurality of incoming ultra-wideband signals and recover data;

at least one filter connected to the correlator;

an energy estimator connected to the at least one filter; and

a pulse detector connected to the at least one filter.

29. (original) A method of receiving and demodulating an ultra-wideband signal, the method comprising the steps of:

means for receiving the ultra-wideband signal, the ultra-wideband signal comprising a plurality of ultra-wideband pulses;

means for generating a template signal;

means for correlating the ultra-wideband signal with the template signal;

means for estimating a coarse timing reference from a correlation of the ultra-wideband signal and the template signal;

means for updating the template signal based on the coarse timing reference;

means for correlating the ultra-wideband signal with the updated template signal;

and

means for detecting an ultra-wideband pulse from the correlation of the ultra-wideband signal and the updated template signal.